PREFABRICATED BUILDINGS ACCORDING TO MODULAR STEEL FRAME CONSTRUCTION METHOD

Background Of The Invention
Field of The Invention

~~Description~~

The present innovative invention deals with the construction of any type of real estate (villas or self-contained houses, multi-story house-building, functional building versions) on the basis of a modular steel frame construction.

Summary Of The Invention

The objective of the present invention is to procure habitation at a very competitive price and to prevent building imperfections through serial production.

These requirements are generally impeded by needless times of waiting, by defects which may occur during the building process and by totally unnecessary transportation distances at the building site.

The problem is solved by the innovative invention and its added products reducing the costs for building erection and for construction and assembly of the building components:

- Reduction to a minimum of the works executed on and at the building site
- Abandonment of the traditional building method
- Production in a plant
- Development of a flexible and modular technologie for construction

- Adoption of an assembly-line, production of houses according to a modular construction method comprising total completion of the building modules, all fittings included.

Objective: Erecting prefabricated houses and buildings of modular steel frame construction ready for immediate occupation.

Other innovative features:

- Reduction of labor time for the production of building components

- Reduction of building defects, delivery of certified building materials

- Reduction of transportation costs, for the materials and the works at site

- Reduction of the total building period for a house

- Reduction of losses of labor time since the workmen are not exposed to weather influences existing at outdoor building sites

- Reduction of costs for object planning and administration

- Improvement of productivity by continuous operation and work to capacity of annual production since influences of bad weather are eliminated.

The present beneficial invention is based upon the perception that the basic construction, exterior and interior walls, fittings and interior finishings, as well as the roof coverings, doors and windows are prefabricated in modules ready for use and

then transported to the building site. The said perception extends over standardized serial buildings and individual homes as well, where the assignors plan can be considered to a large extent.

Observations:

The modular steel frame construction conveys at the end of the building erection phase the impression of a solid stone or brick-wall house. The building floors have oscillation frequences similar to solid concrete floors and show high step and air sound insulation values, particularly when the present method is used for collective housing units. The ceiling diameter corresponds to that of a solid ceiling.

Statics allow multi-story buildings until 5 integral stories at the fixed standard price, with standard cantilever depths up to 14 m and vertical variablity limited to 3.5 m for any additional story above the 5 full stories.

The exterior walls are mechanically robust, highly heat insulating and sound absorbing. The windows show a low K-value and a high air sound insulation value. The roof covers are variable, their durability is great. The standard roof covering can be used in all areas of Germany.

The technical equipment corresponds to future-oriented, state-of-the-art standards allowing extension and updating without reconstruction or substantial modifications.

Furthermore, styling and architectural criteria as well as individual designs can be considered and realized at reasonable supplementary cost.

Finally, the modular steel frame construction method is described as follows:

The floor frame (1) and the ceiling frame (2) consist of a standard steel section C 160, St 37 or St 52 , bevelled and welded.

Z-shaped sections (2) are welded into the floor frame (1) in a well-defined axial distance in order to form flanges or stays allowing to fill the incurved part of the flange with concrete without reinforcing it.

The floor structure or layer (3) consisting of concrete d = 100 mm and undermost of an insulation layer of pressed rockwool d = 60 mm is mounted between the flanges (2) and covered with concrete B 25 without being reinforced. Depending upon statics, the floor layer can have different concrete and insulation layer diameters and can consist of other insulation materials.

The combination between floor frame (1), Z-shaped section (2) as a flange and floor layer (3) is part of the present invention; it generates a solid layer with great bending strength, an excellent oscillation frequence, a fire protection value of F 90 and a high air sound insulation measurement.

The twinned pillars (4) consist of two MSH sections 60/60/5 St 37 or St 52 which are interconnected by steel bridges 80/80/10 welded between them, the axial distance of the latter depending upon statics specifications. In fact, according to static requirements, other twinned pillars of different sections can be interconnected by welded bridges of a different number.

The twinned pillars (4) for their part are welded to the floor frame (1) and the ceiling frame (2) with the help of junction gussets absorbing and transmitting the shearing force of the

building. The number of twinned pillars required is determined by the statics.

The pins (5) consist of turned bars St 37 or other possible materials connecting vertically the twinned pillars (4) of two superposed modules (8) and guiding the modules (8) when mounted one on top of the other.

The pins (5) determine the alignment and precise distance of the superposed module from the module below. The superior part of one of the two pins (5) is elongated and extends beyond the ceiling frame of the module below. This pin is provided for guiding precisely to the mm the sinking down of the superposed module thus reducing the mounting process to a simple plugging in.

The combination between the twinned pillars (4) consisting of two or more MSH sections and the pins (5) ensures an accurate vertical and horizontal building structure through a simple plug connection.

The ceiling frame (6) is an L-section consisting of sheet-steel St 37 or St 52 edged or rolled to an L-section 250/75/5 being bevelled and welded at the corners of the frame.

Perpendicular to the longitudinal direction of the ceiling frame, several C 60 or C 80 sections (7) are welded inside the frame, the distance beween them depending upon static requirements; they support the substructure of the suspended ceiling or the roof.

This allows to produce complete room ceilings in the plant. Concerning the roof, this enables to work simultaneously at the exterior and interior structure of any known type or shape of roof.

The combination of ceiling frame (6) being flange or stay and floor frame (1) is a part of the present invention; it generates a twinned beam (9) allowing a cantilever span of 14 m. According to the span, the construction is interconnected either by screw-bolts or welded.